REMARKS

Claims 1 and 6 have been amended.

The Examiner has objected to applicant's claim 1 because of informalities. In particular, the Examiner has argued that claim 1 lacks clarity and precision because it recites "the plurality of divisional exposure operations" when no plurality of divisional exposure operation has been previously recited. The Examiner has suggested to amend claim 1 to recite "a plurality of divisional exposure operations." Applicant has amended claim 1 in a manner suggested by the Examiner, thereby obviating the Examiner's objection.

The Examiner has rejected applicant's claims 1-10 under 35 USC 103(a) as being unpatentable over the TeWinkle (U.S. Patent No. 7,164,506) patent in view of the Lin, et al. (U.S. Patent No. 6,069,973) and Okisu, et al. (U.S. Patent No. 6,571,022) patents. Applicant has amended applicant's independent claims 1 and 6, and with respect to these claims, as amended, and their respective dependent claims, the Examiner's rejection is respectfully traversed.

Applicant's independent claim 1 has been amended to recite an image sensing apparatus comprising: an image sensing element includes a first light receiving area and a second light receiving area which are formed on an image pickup surface of a semiconductor substrate by a plurality of divisional joint exposure operations, wherein a plurality of color filters of a Bayer arrangement are arrayed on the first and second light receiving areas and pixel signals obtained by the first light receiving area and the second light receiving area are read out from the image sensing element via a same channel; a correction device which corrects difference between output levels of pixel signals output

from the first light receiving area and the second light receiving area via the same channel; and a control device which controls to write a signal corrected by said correction device to a frame memory. Support for the amendments may be found on at least page 4, lines 20-23; page 16, lines 11-9; FIGS. 6A-6C; and FIG. 8 of applicant's specification as filed. No new matter has been introduced.

Applicant's independent claim 6 has been amended to recite: an image sensing apparatus comprising: an image sensing element includes a first light receiving area and a second light receiving area on which color filters of a plurality of colors for sensing an object image are formed, wherein the first and second light receiving areas form a single image sensing surface of the image sensing element by connecting the first and second light receiving areas with each other after divisional joint exposure operations are performed in a manufacturing process of the image sensing element and pixel signals obtained by the first light receiving area and the second light receiving area are read out from the image sensing element via a same channel; a correction device which corrects difference between output levels of pixel signals output from the first light receiving area and the second light receiving area via the same channel; and a control device which controls to write a signal corrected by said correction device to a frame memory. Support for the amendments may be found on at least page 4, lines 20-23; page 16, lines 11-9; FIGS. 6A-6C; and FIG. 8 of applicant's specification as filed. No new matter has been introduced.

The constructions recited in applicants' amended independent claims 1 and 6 are not taught or suggested by the cited art of record. In particular, in accordance with applicant's claimed invention of independent claims 1 and 6, an image sensing element of an image sensing apparatus is manufactured by connecting at least first and second light receiving

areas to create a single image sensing surface of the image sensing element, wherein the first and second light receiving areas have been formed by divisional joint exposure operations as integral parts of the image sensing surface. Further, applicant's independent claims 1 and 6 recite that the image sensing apparatus comprises "a correction device which corrects difference between output levels of pixel signals outputted from the first light receiving area and the second light receiving area via the same channel." That is, in accordance with applicant's claimed invention, the correction device corrects pixel signals that have been (1) acquired by a single sensing element having a single image sensing surface and (2) output via a single channel.

The cited art of record does not teach or suggest such features. In particular, the cited TeWinkle, Lin, et al., and Okisu, et al. patents, alone or in combination with one another, do not teach or suggest correcting pixel signals to reduce the difference between signal levels from the first and second light receiving areas of a single image sensing element, the first and second light receiving areas having been formed by the divisional joint exposure operations during manufacturing of the image sensing element and have been connected to form a single image sensing surface of the image sensing element, as recited in applicant's independent claims 1 and 6.

The Examiner has argued that the combination of TeWinkle and Lin, et al teaches all features of applicant's clam 1 with the exception of the control device. (See Office Action, pages 4-6). In particular, the Examiner has argued that TeWinkle teaches an image sensing apparatus (FIG. 7), which comprises an image sensing element (image sensor array chips 12) manufactured by a plurality of divisional exposure operation such that the image sensing element includes a first light receiving area (chip "I") and a second light receiving

area (chip "II") which are formed on an image pickup surface of a semiconductor substrate (substrate 14 of FIG. 1) by the plurality of divisional exposure operations (as described in col. 2, line 62 – col. 3, line 4), wherein the pixel signals obtained by the first and second light receiving areas are output from the image sensing area via the same channel because, in TeWinkle, chips I and II are connected in series such that they are output onto "a common output line" acting in effect as one large chip with a single shift register. (See Office Action, page 4). The Examiner has acknowledged that TeWinkle does not explicitly teach correcting difference between the output levels of pixel signals output from the first light receiving area and second light receiving area via the same channel. (See Office Action, page 5). However, the Examiner has argued that Lin, et al., in col. 3 lines 31-31 and col. 5, lines 8-16, teaches a multi-chip sensor having a data processor (2), which provides for image signal correction, including chip-to-chip correction, wherein the chips are corrected to output uniform image signals. The Examiner has reasoned that it would have been obvious to a person having ordinary skill in the art to include the correction device of Lin, et al for correcting difference between output levels of pixel signals output from the chips I and II via the same channel for the benefit of outputting image signals that are accurate representation of a scanned document of image, as described in Lin, et al., col. 4, lines 56-64. (See Office Action, pages 5-6). Applicant respectfully disagrees with the Examiner's arguments.

More specifically, TeWinkle discloses that each of a plurality of image sensor array chips (12) mounted on a substrate and butted end-to-end, including chips I and II, includes an "output enable" (OE) connection connecting the chip to the shift register for causing the shift register to sequentially output the image related charges to a "video out" (VO)

connection. (See, col. 2, line 64-col. 3, line 2; col. 3, lines 4-17 and 54-58; FIGS. 1-7). TeWinkle discloses that the video data can be output from the chips in a single serial stream onto a common output line, where the shift register lines of the chips are connected and a short pulse is moved along the shift registers so as to cause photosensors of the chips to serially output the video data, moving from one chip to another, by appropriately connecting respective chips' VO lines. (See, FIG. 7; See, col. 4, line 62-col. 5, line 47). TeWinkle further discloses an alternative arrangement of chips (12), in which the chips output their video data in separate parallel channels. That is, TeWinkle teaches an image sensor array including multiple chips for sensing image data, wherein pixel signals from two different chips of the image sensor array, e.g., chips I and II, may be transported using the serial or parallel readout arrangement and, in either of these arrangements, such pixel signals are read out from the chips I and II via respective individual VO lines of the two different chips, and thus via separate channels.

The structure of the image sensing element in applicant's independent claims 1 and 6 is different from that of TeWinkle. In particular, in applicant's claimed invention, the image sensing element is manufactured with a single image sensing surface, which is formed by connecting at least first and second areas formed by a plurality of divisional joint exposure operations, and in which pixel signals obtained from the first and second light receiving areas are read out via the same channel. Also, as recited in applicant's claim 1, a plurality of color filters of a Bayer arrangement are arrayed on the first and second receiving areas. That is, the image sensing element recited in applicant's claims has a single image sensing surface that includes two light receiving areas which are integral parts of the single image sensing surface of a single image sensing element. In contrast, the

image sensor array of TeWinkle includes multiple chips arranged next to one another, with each chip having its own image sensing surface, and thus, the image sensor of TeWinkle has multiple image sensing surfaces.

Furthermore, TeWinkle makes no mention of the image sensor array having chips that have been formed by a plurality of divisional joint exposure operations. The Examiner appears to argue that such a feature is disclosed in col. 2, line 62 – col. 3, line 4 of TeWinkle. (See Office Action, page 4). However, the cited portion of TeWinkle merely describes how the chips are arranged in the array, but is completely silent as to how the chips are manufactured. Rather, throughout the disclosure, TeWinkle describes chips as individual components (separate integrated circuits) that have been butted together to form an image sensor array. (See e.g., col. 1, lines 31-43). Since the chips of TeWinkle are individual components that are merely butted together, TeWinkle does not teach or suggest that the chips have been manufactured by a plurality of divisional joint exposure operations, as recited in applicant's independent claims.

Moreover, in accordance with applicant's claimed invention, the image signals from the first light receiving area and the second light receiving area, which form a single image pickup surface, are read out via the same channel. Although TeWinkle discloses a serial readout arrangement for the image sensor array, in which pixel signals from two different chips of the image sensor array, e.g., chips I and II, are transmitted to the serial stream via their respective individual VO lines, the pixel signals from the chips are read out via separate channels before being combined into the serial stream. Accordingly, the image sensor array described in TeWinkle has a different structure from the image sensing

element recited in applicant's claims, and thus TeWinkle fails to teach or suggest the image sensing element feature of applicant's independent claims 1 and 6.

Further, assuming *arguendo* that the image sensor array of TeWinkle may be equated to applicant's image sensing element, the combination of TeWinkle and Lin, et al. still fails to teach applicant's correction device, which corrects difference between output levels of pixel signals output from the first and second receiving areas via the same channel. As discussed above, the Examiner has acknowledged that TeWinkle fails to disclose the correction device, but has argued that Lin, et al. teaches such a device. Applicant respectfully disagrees.

Lin, et al. discloses a method for calibrating a multi-chip color image sensor by successively controlling the image sensor to image three different test targets and for generating respective sets of correction factors, wherein the first set corrects for pixel-to-pixel variations between imaging elements of the image sensor, the second set corrects for chip-to-chip variations between chips of the image sensor, and the thirds set corrects for array-wide variations of the image sensor. (See Abstract, FIG. 4, col. 1, line 58 – col. 2, line 26). In particular, Lin, et al. discloses generating the first a set of correction factors at the imaging element level, using a white uniform target; the second set of correction factors at the chip level, using a color target and based on signals generated by the imaging elements and corrected using the first set of correction factors; and the third set of correction factors at the image sensor array level, using color patches of known color and based on signals generated by the imaging elements and corrected successively using the first and second sets of correction factors. (See col. 5, lines 1-27; FIGs. 2 and 3).

However, Lin, et al. makes no mention of a correction device for correcting the difference between output levels of pixel signals output from the first and second receiving areas via the same channel, wherein the first and second receiving areas have been formed by the divisional joint exposure operations and are connected form a single image sensing surface of the image sensing element, as recited in applicant's independent claims. The Examiner, has argued that the data processor (2) of Lin, et al. is the correcting device of applicant's invention because it provides for chip-to-chip variation correction. (See Office Action, page 5). Applicant respectfully disagrees.

Lin et al., discloses that the chip-to-chip variations are caused by non-uniformity in the color filter coating thickness on each chip. (See col. 5, lines 9-11). However, nowhere does Lin, et al. describe that the chips, whose variations require correction, are formed by the divisional joint exposure operations and connected to form a single image sensing surface of the image sensing element. Rather, Lin, et al. teaches generating different correction factors in a different manner for correcting respectively for pixel-to-pixel, chip-to-chip, and wide array variations. Lin, et al., however, is completely silent as to any variations caused by the divisional joint exposure operations that form the first and second light receiving areas integrally connected to form a single image sensing surface of the image sensing element. Therefore, Lin, et al. simply cannot teach or suggest the correction device that corrects difference between output levels of pixel signals output from the light receiving areas formed by divisional joint exposure operations.

Moreover, Lin, et al. makes no mention of correcting pixel signals output via the same channel from two areas of the same image sensing element. Rather, Lin, et al. discloses generating correction factors for each image sensing element of image sensor

array, wherein chip-to-chip correction factors are used for each chip so that each of the different chips outputs uniform corrected image signals.

The Examiner has argued that, in TeWinkle, the pixel signals from different chips are output via a common output channel when the signals from different chips are combined in a serial output. However, since the correction device in Lin, et al. requires distinguishing between image signals output from different imaging elements, i.e. the chips' components, such a correction device would not be able to correct the signals output by different chips after they all have been placed in a common channel. Accordingly, if the teachings of TeWinkle and Lin, et al. are combined as suggested by the Examiner, the resulting apparatus would not include a correction device that corrects difference between output levels of pixel signals output via the same channel from two different light receiving areas of the same image sensing element.

In sum, because TeWinkle and Lin, et al., alone or in combination with one another, do not teach the same structure of the image sensing element as the applicant's invention and do not teach the correction device feature of applicant's independent claims, applicant's independent claims patentably distinguish over the TeWinkle and Lin, et al. references. Accordingly, applicant's amended independent claim 1 which recites an image sensing element including a first light receiving area and a second light receiving area which are formed on an image pickup surface of a semiconductor substrate by a plurality of divisional joint exposure operations, wherein a plurality of color filters of a Bayer arrangement are arrayed on the first and second light receiving areas and pixel signals obtained by the first light receiving area and the second light receiving area are read out from the image sensing apparatus via a same channel, and a correction device which corrects the difference

between output levels of pixel signals output from the first light receiving area and the second light receiving area via the same channel, and applicant's amended independent claim 6, which recites an image sensing element including a first light receiving area and a second light receiving area on which color filters of a plurality of colors for sensing an object image are formed, wherein the first and second light receiving areas form a single image sensing surface of the image sensing element by connecting the first and second light receiving areas with each other after divisional exposure operations are performed in a manufacturing process of the image sensing element and pixels obtained by the first light receiving area and the second light receiving area are read out from the image sensing element via a same channel, and a correction device which corrects difference between output levels of pixel signals output from the first light receiving area and the second light receiving area via the same channel, and their respective dependent claims, patentably distinguish over the TeWinkle and Lin, et al. references. Moreove, the Okisu, et al. patent does not anything to the teachings of TeWinkle and Lin, et al. to change this conclusion.

In view of the above, it is submitted that applicant's claims patentably distinguish over the cited references. Accordingly, reconsideration of the claims is respectfully requested. If the Examiner believes that an interview would expedite consideration of this Amendment or of the application to issue, a request is made that the Examiner telephone applicant's undersigned attorney at (212) 790-9286.

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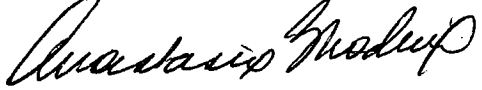
Respectfully submitted,



COWAN, LIEBOWITZ & LATMAN, P. C.
1133 Avenue of the Americas
New York, New York 10036
T (212) 790-9286

Anastasia Zhadina
Reg. No. 48,544
Attorney for Applicant